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ABSTRACT

This study investigated the Zajonc-Cottrell theoretical conflict pertaining to drive by testing children during early learning on a gross motor task, with the audience effect paradigm of social facilitation. Two hundred forty youngsters served as subjects. They were selected randomly from both sexes and equally from a large preschool and public school second grade. Each subject completed 10 trials on the stabilometer task under an "Alone" or an "Audience" learning condition. Average and trend learning scores were computed for each subject. Second-grade subjects attained a higher level of performance than did preschool subjects. The analysis for rate of learning revealed an interaction between audience conditions and age levels. Preschool subjects learned in the "Alone" condition at a higher rate than when in the presence of an audience. However, second-grade subjects learned at a higher rate in the presence of an audience than in the "Alone" condition. Within the limitations of this study, it was concluded that the motor response tendencies of children are most probably influenced by their prior social experiences. This conclusion tended to support the Cottrell hypothesis that performance, in the audience paradigm of social facilitation, is dependent upon the child's social history. (Author/JA)

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SOCIAL FACILITATION EFFECTS ON CHILDREN DURING EARLY STAGES OF MOTOR LEARNING

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by

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INTRODUCTION

Consider the following:

Two children are given instruction in a novel motor learning task. Both children understand the nature of the task, are capable of learning the task, and are ready to attempt several trials. One child attempts his series of initial learning trials in the presence of an audience. The other child attempts his series of trials all alone. Concerning only the treatment effect of Audience versus Alone, should the subject learning in the presence of an Audience perform better than, worse than, or the same as the subject performing Alone on the series of initial learning trials?

Conflicting Hypotheses

There have been presented two basic and conflicting hypotheses pertinent to the stated problem.

Zajonc[6]

Zajonc has linked the two social facilitation paradigms, audience effects and co-action effects, to the Hull-Spence drive (D) theory (Spence[7]). From this theoretical position Zajonc has hypothesized that the presence of an Audience causes an increase in a subject's general drive (D) level relative to an Alone subject. In this heightened drive state a subject will respond to task stimuli with those responses that are dominant at the time the stimuli are presented. In early performance trials of a novel learning task the subject has not necessarily established correct response patterns to the task stimuli. In initial stages of learning the task stimuli may elicit strong and competing incorrect response tendencies which, in the event of a heightened drive state, will consequently predominate over the weaker correct response tendencies.

In the later stages of learning, or during the performance of a known task, correct responses to the task stimuli become progressively predominate

and consequently a subject, when performing in the presence of an audience, will respond more frequently with the correct responses.

Zajonc has implied that this increased drive, as a function of the presence of the audience, is innate within each individual (Cottrell[6]). From this interpretation one would expect children to perform learning and performance tasks in the presence or absence of an audience with results quite similar to those recorded from adult performances.

In relating the theory to the social facilitation problem which was initially presented, it is apparent that Zajonc would predict that the child who performed his early learning trials of the motor task in the presence of an audience (high drive state) would respond with dominant incorrect responses for a greater number of trials than would the alone (lower drive) child. Cottrell[1,2]

Recently Cottrell has hypothesized that the increased level of drive caused by the presence of an audience is not, as implied by Zajonc, an innate source of drive. Instead, he has proposed that it is a "learned source of drive." Cottrell has stated that the drive is a function of the social experiences of the individual.

> It is assumed that at birth the stimuli produced by the mere presence of another organism are motivationally neutral; they neither increase nor decrease the individual's general drive level. Various aversive and gratifying events that serve to increase the individual's general drive level occur throughout the individual's life. Many of these events are spatially and temporally contiguous with the presence of others. ... With an increasing number of such encounters, the stimuli from the mere presence of others gradually lose their neutral quality and become, through classical conditioning, sufficient to increase the individual's drive level.[2:53-54]

The drive state of an individual is dependent upon the inevitability of positive or negative outcomes to him as a result of the evaluative tendencies of the audience. Because of one's previous social experiences he will come to anticipate specific outcomes in the presence of an audience, and it is this anticipation of outcomes which increases his drive level.

Innerent in the Cottrell learned drive interpretation of social facilitation is the suggestion that children, who have had comparatively fewer social experiences than adults, will similarly have lesser developed anticipations of positive and negative outcomes in the presence or absence of an audience. It also follows that these same children could respond to task stimuli in the presence or absence of an audience to a lesser degree than adults who are confronted with a similar task and audience situation.

Purpose of Study

There has been no social facilitation research completed in the area of motor learning to clarify the Zajonc - Cottrell conflict relative to an innate versus a learned source of drive.

The purpose of this study was to investigate the conflicting hypotheses posited by Zajonc and Cottrell relative to learning a gross motor skill.

PROCEDURE FOR OBTAINING DATA

Introduction

The administrative procedures and instructions to the subjects were developed as a result of the children's behavior observed during four pilot studies.

Subjects

One hundred and twenty second-grade children from the Linn-Mar Community School District of Marion, Iowa, and 120 children from the Jack and Jill Preschool at Marion, Iowa, were used as subjects.

Apparatus

The apparatus utilized was a stabilometer, which was a pivoted balancing platform, and which required a balancing skill similar to that required for the bongo or teeter board. The subjects were required to perform one of two stabilometer tasks as described below.

Difficult Task - The stabilometer was so set that the allowable in-balance axis of rotation was three degrees (refer to Figure 1).

Easy Task - The stabilometer was so set that the allowable in-balance axis of rotation was six degrees (refer to Figure 2).

Grouping of Subjects

The second-grade and preschool children were grouped according to the scheme presented in Figures 3 and 4.

Testing Procedure

Each subject was informed that the instructions for playing the game would be given to him by a tape recorder. The Alone condition instructions were slightly different than the Audience condition instructions in that the subject was informed that the experimenter would not be in the room during the Alone condition, but that he would be present and would observe the subject in the Audience condition.

During the trials for the Alone subjects, the experimenter observed them from a concealed position outside the testing room. Atypical behavior was recorded on the subject's score sheet.

During the trials for the Audience condition subjects, the experimenter sat directly in front of the subject and without making gestures or verbal comment to the subject, observed his trial-to-trial performance. Unusual behavior by the subject was later recorded on his score sheet.

The testing procedure for both the Alone and Audience subjects required slightly less than 11 minutes.

ANALYSIS OF DATA

Scoring of Data

The primary purpose of this investigation was to compare trends in early learning as influenced by the presence or absence of an audience. To analyze rate of learning each subject's 10 time-in-balance raw data scores were converted into a time-in-balance trend score by computing a regression line, or line of best fit, as described by Huntsberger and Leaverton[5]. An additional analysis was completed using mean time-in-balance performance scores for each subject's 10 trials. The calculations for trend scores, mean scores, and standard deviations were accomplished at the University of Iowa Computer Center.

Level of Significance Selected

For all analyses, the .05 level of significance was selected for testing the null hypothesis.

Reliability of Data

Intraclass reliabilities, as described by Ebel[4], were computed for time-in-balance scores across all trials for each of the 16 groups, the 120 subjects who completed the Easy task, and the 120 subjects who completed the Difficult task. The reliabilities for the 16 groups ranged from .01 to .97. The reliabilities computed for the Easy task and Difficult task subjects were .97 and .96 respectively.

Reliability coefficients for learning on the Easy and Difficult tasks were calculated by correlating the change score of the odd-numbered trials (9 - 1) with that of the even-numbered trials (10 - 2). Values of .90 and .95 were obtained respectively for the Easy and Difficult tasks.

Statistical Analyses and Results

Rate of Learning and Performance Across Age Levels

A four-dimensional analysis of variance design, as described by Lindquist[6] was used to analyze the data to compare rates of learning and to

compare performance for the following conditions: preschool - second-grade, male - female, audience - alone, and easy task - difficult task. The analyses were based on

1. the learning rates (trends) of each of the 16 groups (see Table I),
2. and the performance levels of the 16 groups (see Table I).

As shown in Table II, the only difference found in the analysis for learning rates was an Audience condition and Age level interaction (Figure 5).

As shown in Table III, the performance analysis resulted in:

1. An interaction for Audience condition, Difficulty level, and Age level (see Figure 6).
2. An interaction for Sex, Difficulty level, and Age level (see Figure 7).
3. An interaction for Difficulty level and Age level (see Figure 8).
4. A main effect for Age level.
5. A main effect for Difficulty level.

Rate of Learning and Performance at Specific Age Levels

A three-dimensional analysis of variance design, as described by Lindquist[6] was used to analyze the data for learning rates and performances at each age level. The analyses were based on

1. the learning rates (trends) of each of the eight groups (see Table I),
2. and the performance levels of the eight groups (see Table I).

The three-dimensional analysis for preschool subjects resulted in a higher learning rate from the Alone condition than from the Audience condition (see Table IV).

As shown in Table V, the differences in performance for preschool subjects were:

1. An interaction for Sex and Difficulty level (see Figure 7).
2. A main effect for Difficulty level.

3. As shown in Table IV, the only difference found in rate of learning for second-grade subjects was a main effect for Audience condition.

As shown in Table V, the performance differences for second-grade subjects were:

1. A main effect for Audience condition.

2. A main effect for Difficulty level.

Analysis to Determine Learning

To determine if the performance level did change over 10 trials, a t-test for related data was completed which compared the mean time-in-balance score of trials one and two with the mean time-in-balance score of trials nine and ten for each of the 16 groups.

Eight of the 16 groups improved their performance as a result of the 10 practice trials (see Table VI).

Discussion of Results

Learning Rate and Performance Across Age Levels

The Audience condition by Age level interaction (see Figure 5) found in the analysis for trends did not support Zajonc's theoretical position in that there was not a consistent and higher rate of learning for the Alone subjects at both Age levels. The rate of learning for preschool subjects was greater in the Alone condition than in the Audience condition, however the second-grade subjects had a higher rate of learning in the Audience condition. This interaction supported Cottrell's suggestion that prior social experiences may influence the response tendencies of the individual. However, the direction of the interacting variables did not materialize in a manner consistent with Cottrell's hypothesis. He would have predicted that the preschool subjects, who are less socially conditioned, would have improved their performance at the same rate in the two conditions; while the second-grade subjects, who are more socially conditioned, would have learned more rapidly when Alone than when learning in the presence of an Audience.

The performance interaction for Audience condition, Age level, and Difficulty level (see Figure 6) reflected support for Cottrell who has hypothesized that performance in the presence or absence of an Audience is dependent upon one's prior social experiences in similar situations. The performances of the preschool subjects in the Easy and Difficult tasks were not similar to the respective performances of the second-grade subjects in either the Audience condition or the Alone condition. Had social experiences been inconsequential, the children in the two age levels would have responded similarly in the Audience condition and similarly in the Alone condition.

The performance main effect for Age level which indicated a higher level of achievement for second-grade subjects as compared to preschool subjects, was consistent with the finding by Davol, Hastings, and Klein[2], who reported that level of ability on the pursuit rotor task was commensurate with age level for children.

The performance main effect for Difficulty level, which indicated a higher level of performance by the subjects who learned the Easy task than those who learned the Difficult task, was consistent with the graphical results of Pilot Studies.

Learning Rate and Performance at Specific Age Levels

Zajonc has implied that subjects tested Alone would universally learn (improve performance) at a greater rate during early learning than the subjects tested in the presence of an Audience. This tendency should be more pronounced in a more difficult task as contrasted to an easier task because of the predomination of errors in the more difficult task.

In contrast, Cottrell's theoretical position is that, dependent upon the level of social experiences of the individuals, the subjects tested Alone will not necessarily learn at a faster rate than the subjects tested in the presence of an Audience. The difficulty of the task is not relevant to the comparative rates of learning if the subjects have not been socially

conditioned. Older subjects, who have progressively more conditioned behaviors in social situations, should eventually reflect the response patterns described by Zajonc.

The rate of learning for preschool subjects tested in the presence of an Audience was lower than the rate of learning for preschool subjects tested Alone. This finding was of interest because it was in direct opposition to that for second-grade subjects and supported Zajonc's position.

Without regard for level of task difficulty, the learning rate and performance for second-grade subjects who were tested in the presence of an Audience were higher than the learning rate and performance for subjects tested Alone. These findings did not support Zajonc's hypothesis in that he would have predicted a greater level of achievement by the Alone subjects. In one respect these findings supported Cottrell in that he would have predicted differences in achievement for the Audience and Alone subjects dependent upon the differences in the social experiences of second-grade subjects. The subjects tested appeared to respond to a social environment in that they were apprehensive at being left Alone, a condition seldom encountered during their previous learning situations. In contrast, the subjects tested in the presence of an Audience appeared to be calm during their practice trials, a situation that was consistent with their previous school activities.

CONCLUSIONS

Based upon the results and discussion and within the limitations of this study, it was concluded that the motor response tendencies of children are most probably influenced by their prior social experiences. This conclusion tended to support the Cottrell hypothesis that performance, in the audience effect paradigm of social facilitation, is dependent upon the child's social history.

LIST OF REFERENCES

1. Cottrell, N. B. "Performance in the Presence of Other Human Beings: Mere Presence, Audience, and Affiliation Effects," in Social Facilitation and Imitative Behavior. (ed. by E. C. Simmel). Boston: Allyn and Bacon, Inc., 1968, 253 pp.

2. Cottrell, N. B. "Social Facilitation," in Experimental Social Psychology (ed. by C. G. McClintock). New York: Holt, Rinehart, and Winston, Inc., In Press.

3. Gavol, J. H., H. L. Hastings, and D. A. Klein. "Effect of Age, Sex, and Speed of Rotation on Rotary Pursuit Performance by Young Children," Perceptual and Motor Skills 21 (October 1965), pp. 551-57.

4. Ebel, R. L. "Estimate of the Reliability of Ratings," Psychometrika 16 (December 1951), pp. 407-24.

5. Huntsberger, D. V., and P. L. Leaverton. Statistical Inference in the Biomedical Sciences. Boston: Allyn and Bacon, Inc., 1970, 269 pp.

6. Lindquist, E. F. Design and Analysis of Experiments in Psychology and Education. Boston: Houghton Mifflin Company, 1956, 393 pp.

7. Spence, K. W. Behavior Theory and Conditioning. New Haven: Yale University Press, 1956, 262 pp.

8. Zajonc, R. B. "Social Facilitation," Science 149 (July 1965), pp. 269-74.

SUPPLEMENTARY SLIDES

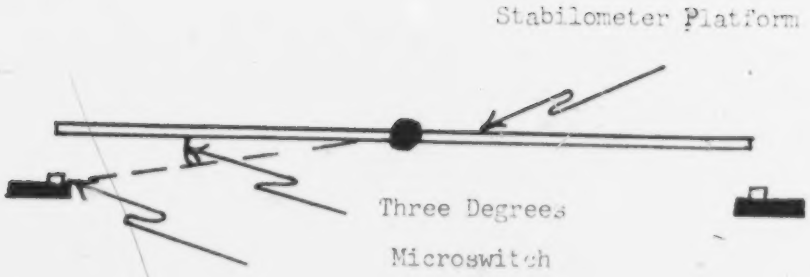

Figure 1

Difficult Task

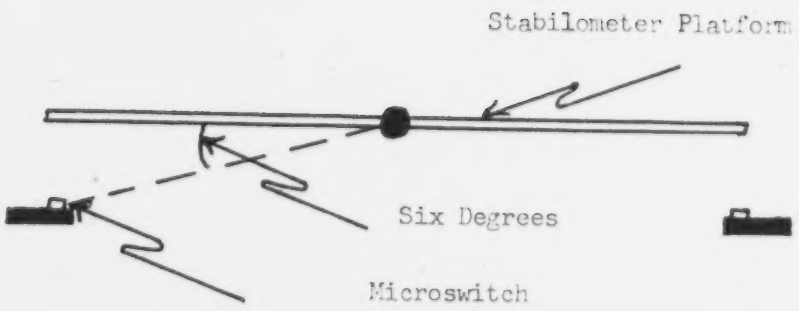

Figure 2

Easy Task

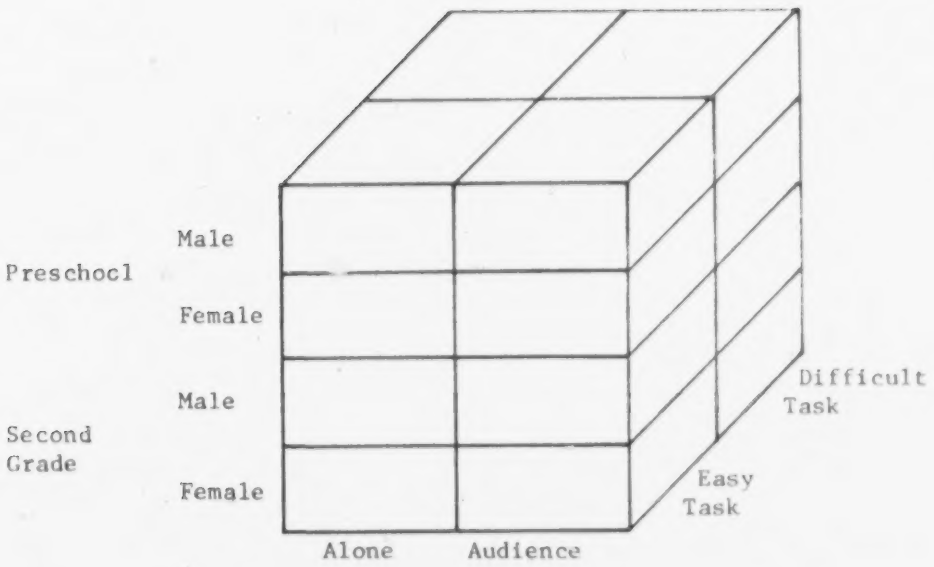

Figure 3

Three-Dimensional Diagram of the

16 Groups of Subjects

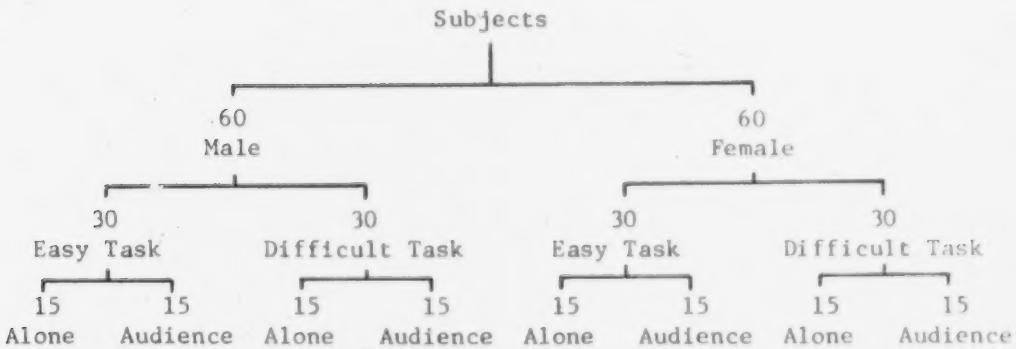

Figure 4

Group Assignment Chart for Subjects*

*The 120 preschool children and the 120 second-grade children were assigned to groups for testing as depicted in the chart.

Table I

Performance Trends and Means for

Time-In-Balance Scores

Group	Trend $\bar{X}$*	SD	$\bar{X}_{\text{Trials 1-10}}$**	SD
Preschool				
Female				
Audience - Easy	.08	.21	4.83	1.98
- Difficult	.10	.14	3.68	1.34
Alone - Easy	.14	.19	5.13	1.84
Difficult	.16	.21	2.76	1.79
Male				
Audience - Easy	.04	.17	4.29	1.73
Difficult	.05	.08	4.03	.59
Alone - Easy	.12	.17	4.66	1.10
Difficult	.09	.11	3.70	.99
Second-Grade				
Female				
Audience - Easy	.09	.13	7.07	.78
- Difficult	.07	.11	5.07	1.14
Alone - Easy	.03	.14	6.67	.75
- Difficult	.01	.14	5.04	.97
Male				
Audience - Easy	.13	.07	7.19	.52
- Difficult	.06	.10	4.93	.76
Alone - Easy	.08	.08	6.51	.68
- Difficult	.04	.10	4.79	.75

*sec./trial

**sec.

Table II

Four-Dimensional ANOVA Summary for

Time-In-Balance Trend Scores

Source	SS	df	MS	F
Within Cells	4.52	224	.02	
Sex	.01	1	.01	.32
Audience Condition	.00	1	.00	.10
Difficulty Level	.01	1	.01	.70
Age Level	.06	1	.06	3.07
Sex-Audience	.00	1	.00	.11
Sex-Difficulty	.02	1	.02	1.03
Sex-Age	.07	1	.07	3.34
Audience-Difficulty	.00	1	.00	.01
Audience-Age	.18	1	.18	8.71*
Difficulty-Age	.02	1	.02	1.16
Sex-Audience-Difficulty	.00	1	.00	.01
Sex-Audience-Age	.00	1	.00	.15
Sex-Difficulty-Age	.00	1	.00	.00
Audience-Difficulty-Age	.00	1	.00	.21
Sex-Audience-Difficulty-Age	.00	1	.00	.20

*Significant at .05 level of confidence.

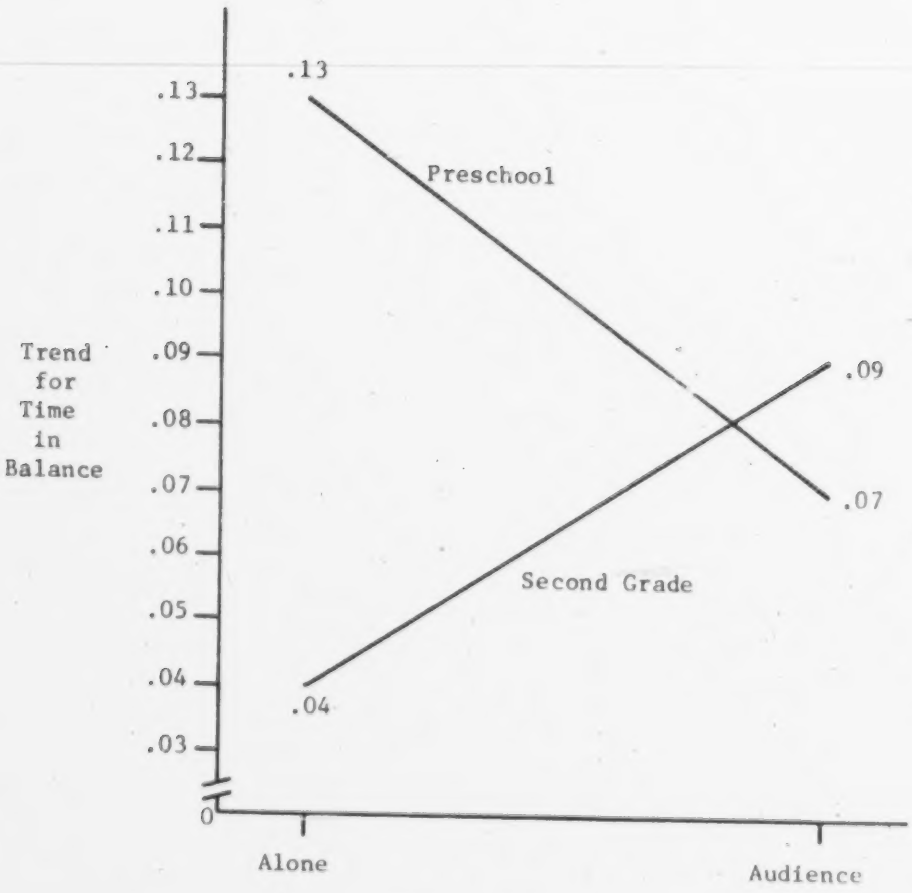

Figure 5

Audience Condition x Age Level Interaction for Trends

Table III

Four-Dimensional ANOVA Summary for Time-In-Balance

Mean Performance Scores

Source	SS	df	MS	F
Within Cells	323.10	224	1.44	
Sex	.02	1	.02	.01
Audience Condition	3.14	1	3.14	2.17
Difficulty Level	143.16	1	143.16	99.25*
Age Level	188.59	1	188.59	130.75*
Sex-Audience	.08	1	.08	.06
Sex-Difficulty	3.63	1	3.63	2.52
Sex-Age	.47	1	.47	.32
Audience-Difficulty	.97	1	.97	.67
Audience-Age	.43	1	.43	.30
Difficulty-Age	7.69	1	7.69	5.33*
Sex-Audience-Difficulty	.45	1	.45	.31
Sex-Audience-Age	1.01	1	1.01	.70
Sex-Difficulty-Age	6.53	1	6.53	4.53*
Audience-Difficulty-Age	7.61	1	7.61	5.28*
Sex-Audience-Difficulty-Age	.12	1	.12	.08

*Significant at .05 level of confidence.

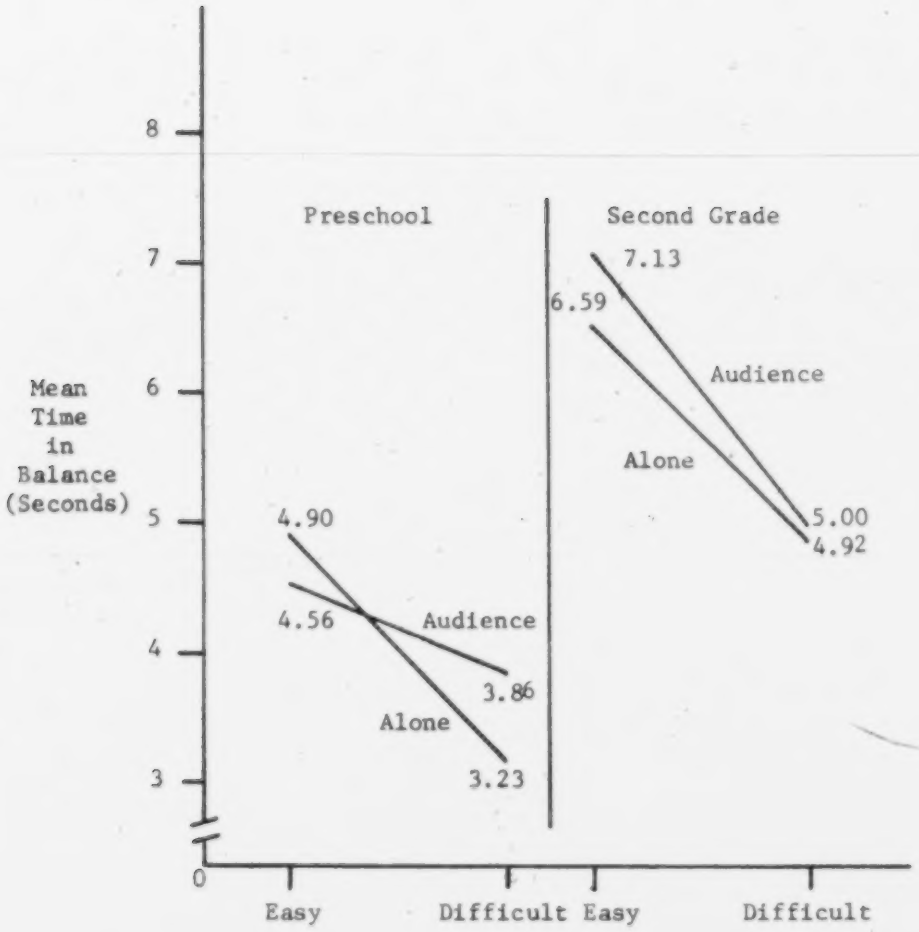

Figure 6

Audience Condition x Age Level x Difficulty Level Interaction

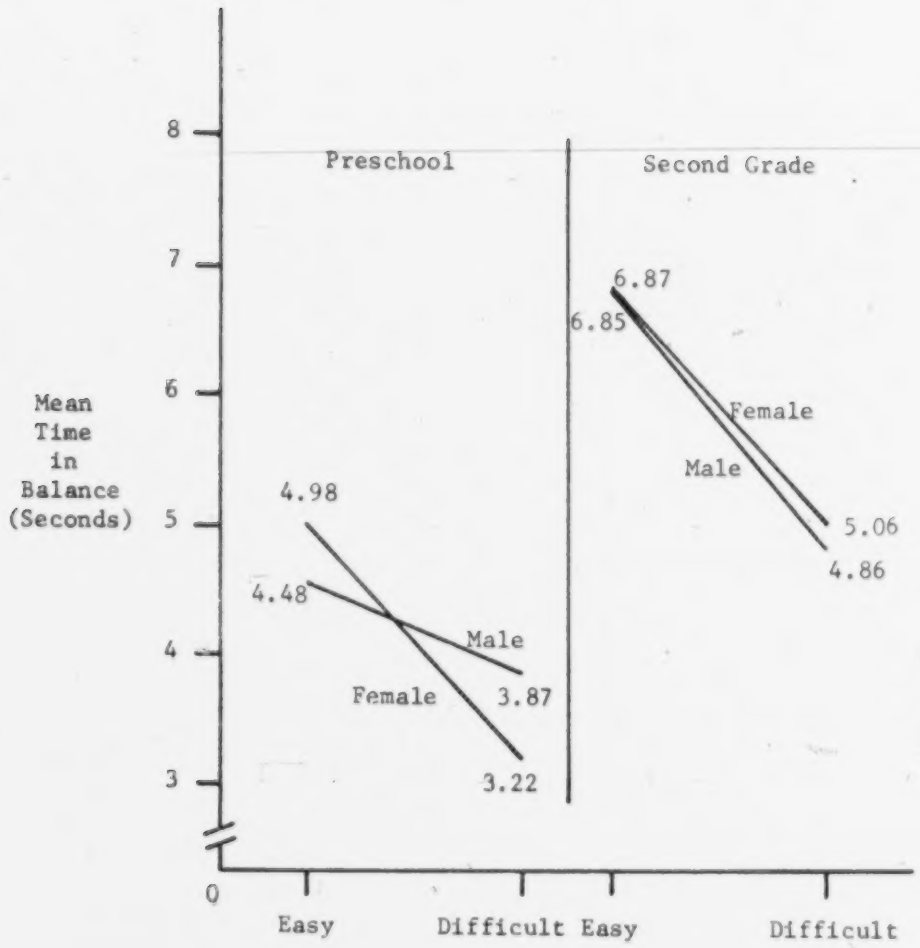

Figure 7

Sex Condition x Age Level x Difficulty Level Interaction

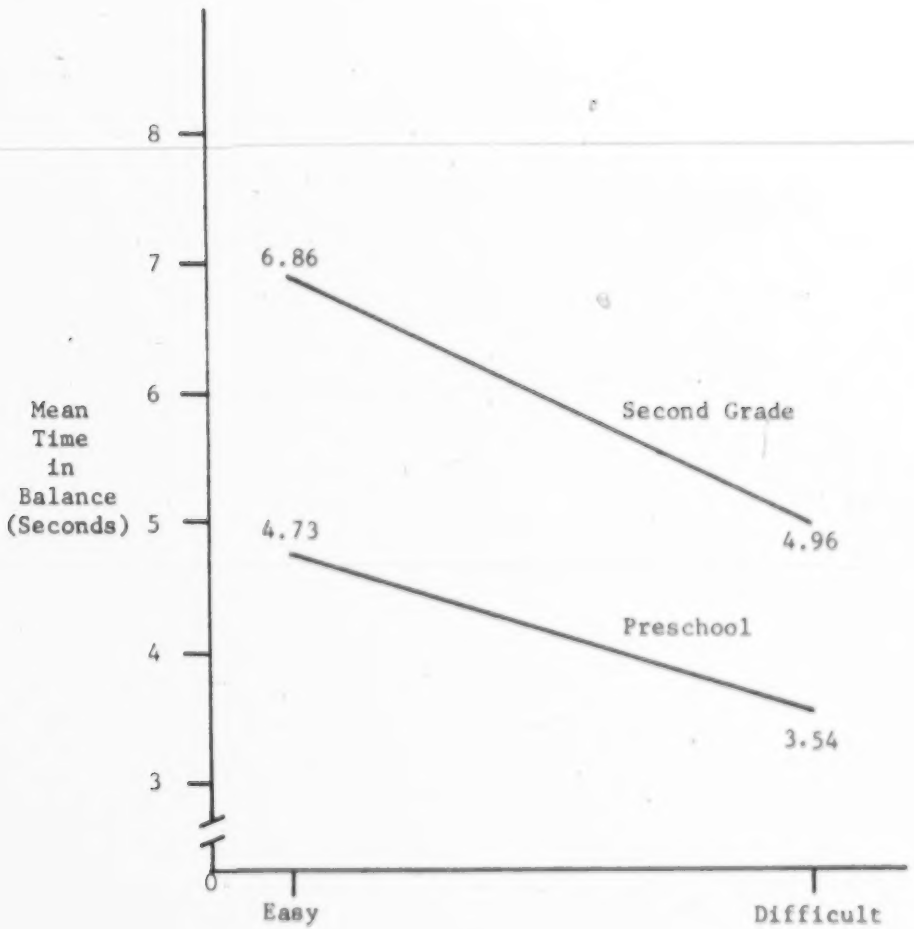

Figure 8

Difficulty Level x Age Level Interaction

Table IV

Three-Dimensional ANOVA Summary for

Time-In-Balance Trend Scores

Source	SS	df	MS	F
Preschool				
Within Cells	3.08	112	.03	
Sex	.06	1	.06	2.10
Audience Condition	.11	1	.11	3.90*
Difficulty Level	.00	1	.00	.02
Sex-Audience	.00	1	.00	.00
Sex-Difficulty	.01	1	.01	.43
Audience-Difficulty	.00	1	.00	.11
Sex-Audience-Difficulty	.00	1	.00	.11
Second-Grade				
Within Cells	1.44	112	.01	
Sex	.02	1	.02	1.25
Audience Condition	.07	1	.07	5.47*
Difficulty Level	.04	1	.04	2.87
Sex-Audience	.05	1	.01	.40
Sex-Difficulty	.01	1	.01	.71
Audience-Difficulty	.00	1	.00	.10
Sex-Audience-Difficulty	.00	1	.00	.09

*Significant at .05 level of confidence.

Table V

Three-Dimensional ANOVA Summary for Time-In-Balance

Mean Performance Scores

Source	SS	df	MS	F
Preschool				
Within Cells	249.36	112	2.23	
Sex	.15	1	.15	.07
Audience Condition	.63	1	.63	.28
Difficulty Level	42.24	1	42.24	18.97*
Sex-Audience	.83	1	.83	.37
Sex-Difficulty	9.95	1	9.95	4.47*
Audience-Difficulty	7.00	1	7.00	3.15
Sex-Audience-Difficulty	.51	1	.51	.23
Second-Grade				
Within Cells	73.74	112	.66	
Sex	.34	1	.34	.52
Audience Condition	2.94	1	2.94	4.46*
Difficulty Level	108.61	1	108.61	164.96*
Sex-Audience	.26	1	.26	.40
Sex-Difficulty	.21	1	.21	.32
Audience-Difficulty	1.58	1	1.58	2.39
Sex-Audience-Difficulty	.05	1	.05	.08

*Significant at .05 level of confidence.

Table VI

Within Group t Values for Time-In-Balance

to Determine Learning

Group	$\bar{X}$ Trials 1-2	$\bar{X}$ Trials 9-10	t
Preschool			
Female			
Audience - Easy	4.26	5.20	2.24*
Difficult	3.13	3.92	2.72*
Alone - Easy	4.17	5.44	3.09*
Difficult	2.10	3.44	2.83*
Male			
Audience - Easy	4.02	4.41	.99
Difficult	3.73	4.11	1.75
Alone - Easy	4.06	5.02	2.58*
Difficult	3.02	3.77	3.42*
Second-Grade			
Female			
Audience - Easy	6.75	7.40	1.61
Difficult	4.55	5.19	1.39
Alone - Easy	6.22	6.66	1.20
Difficult	4.83	5.18	1.12
Male			
Audience - Easy	6.56	7.71	7.82*
Difficult	4.67	5.10	1.19
Alone - Easy	6.14	6.87	3.59*
Difficult	4.45	4.93	2.14

*Significant at .05 level of confidence.

N = 15/group.

END

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